

ABSTRACT OF THE DISCLOSURE

A wavelength router to be used for fiber optical networking router is based on a diffraction grating which utilizes only  $N$  wavelengths to interconnect  $N$  inputs to  $N$  outputs. The basic approach is to augment the grating with additional couplers or wavelength selective elements so that  $N-1$  of the  $2N-1$  outputs are combined with other  $N$  outputs (leaving only  $N$  outputs). One embodiment uses directional couplers as combiners. Another embodiment uses wavelength-selective couplers. Another embodiment uses a pair of diffraction gratings to maintain parallel propagation of all optical beams. Also, beam combining can be implemented either by using retroreflection back through the grating pair or by using couplers.